Scientific Report on the implementation of the project "Portfolio Selection Models and Applications" 2015

Objectives of the project for the year 2015 are

1. Objective 1. Single period portfolio selection models with complementary constraints.
   Research activities connected to realization of the first objective are:
- Estimations of the optimal values for the portfolio selection problems with transaction costs;
- Numerical analysis of the results and sensitivity analysis of the models.
2. Objective 2. Multi-period portfolio selection models with complementary constraints.
   Research activity connected to realization of the first objective is:
   Formulation of multi-period portfolio selection models with complementarity constraints
   This activity will be continued in the 6-th stage of the project from the year 2016.

The expected results to be obtained in the 5-th stage of the project are:

- Research report
- Dissemination of results in symposiums, national and international conferences
- Scientific articles published in ISI indexed journals.

Research activities connected to the first objective can be found in the papers [1]-[7]. The corresponding results were disseminated in the following talks given at the conferences [C01] - [C05].

In the paper [1] several models, inspired from the financial portfolio theory, for the selection of software vendor firms were formulated. The models contain complementarity constraints. The performances of the software products commercialized by the software vendor firms are evaluated by several experts. A minimum risk model which is a binary programming model is formulated. A procedure for solving the above mentioned minimum risk model is described.

A numerical example for commercialization of a software product of ERP type was analyzed.

In the research report [7] an analysis of portfolio selection models with transaction costs is performed. For the case of linear transaction costs two equivalent models are described. The first model has non-smooth constraints. The second model has complementarity constraints.

The models of the second type are equivalent to models of mixed-binary type. Several heuristic algorithms for solving the models with complementarity constraints. A numerical analysis of the results and a sensitivity analysis was performed.
A formulation of multi-period portfolio selection models with complementary constraints is presented in [7].
The portfolio optimization problem with loss aversion is studied in the paper [4]. An integrated and innovative methodological approach for portfolio selection which incorporates the investor preferences in the mean-risk models is presented. A measure for the risk assessment which captures very well the investor behavior is built. The measure is compatible with the models with complementarity constraints. The properties of the risk measure and its connection with the stochastic dominance criteria, CVaR measure and with the lower partial moment measure is studied. A decision support system for the portfolio selection is presented in the paper [5]. The methodological approach is integrated and innovative. The validity of the proposed approach is tested through an illustrative application in the New York Stock Exchange. Moreover the differences and similarities between the efficient frontier of the proposed model and the classical Mean-Variance are evaluated. In the papers [2] and [3] the ruin probabilities of insurance firms are computed.
In the talks [C02] and [C03] several algorithms for the solution of problems with complementarity constraints are presented. The algorithms solve a sequence of mathematical programming problems whose set of feasible solutions are convex. Portfolio selection models with multiple objectives were presented in the talk [C04]. The models include transaction costs and complementarity constraints.
All the targets of the research project were successfully met in the 2015 stage.
Tasks to disseminate the results obtained in the 2015 stage have been met. The results were disseminated in the context of talks given at prestigious scientific conferences. The expected results to be obtained were published in ISI and non-ISI indexed journals of repute. A research report on the subject was written.

Papers published in international journals (ISI indexed)

[1] Radulescu M., Radulescu C.Z., A portfolio theory approach to software vendor selection, Studies in Informatics and Control, Vol. 24, No. 4, (2015), 8p. (IF 2014 = 0.905)

[2] Raducan A.M., Vernic R., Zbaganu Gh., Recursive calculation of ruin probabilities at or before claim instants for non-identically distributed claims, ASTIN Bull., 45 (2) (2015), pp. 421–443.(IF 2014 = 0.738)

[3] Raducan A.M., Vernic R., Zbaganu Gh., On the ruin probability for nonhomogeneous claims and arbitrary inter-claim revenues, Journal of Computational and Applied Mathematics, 290 (2015), 319–333. (IF 2014 = 1.266) Relative Influence Score:

Papers accepted for publication in international journals (ISI indexed)

[4] Fulga C., Portfolio optimization under loss aversion, European Journal of Operational Research, 10.1016/j.ejor.2015.11.038 (IF 2014 =2.358)

Papers published in international journals (non-ISI indexed)

[5] Fulga C., Integrated bi-criteria decision support system for portfolio selection, Journal of Decision Systems, 24, (2), (2015), 159-177. DOI: 10.1080/12460125.2015.1046684

Papers sent for publication in international journals (ISI indexed)

[6] Raducan A.M., Vernic R., Zbaganu Gh., How common sense can be misleading in ruin theory, Proc. Romanian Academy, Ser. A.

Research report

[7] Radulescu M., Radulescu C.Z., Single period and multi-period portfolio selection models with complementarity constraints.

Dissemination of the results in prestigious conferences in the field

Talks given at the national conferences

[C01] Radulescu M., Radulescu C. Z., Portfolio selection models with transaction costs and initial holdings. An approach that takes into account complementarity constraints, A 18-a CONFERINȚĂ a SOCIETĂȚII de PROBABILITĂȚI si STATISTICĂ, Bucuresti 2015.

Talks given at international conferences

[C02] Radulescu M., Radulescu C.Z., Single period portfolio selection models with transaction costs and initial holdings, 13th EUROPT Workshop on Advances in Continuous Optimization, 2015.

[C03] Radulescu M., Radulescu C. Z., Portfolio selection models with proportional transaction costs and initial holdings, 27th European Conference on Operational Research, 2015.

[C04] Radulescu M., Radulescu C. Z., Multiobjective portfolio selection models with complementarity constraints, MCDM 2015 – 23rd International Conference on Multiple Criteria Decision Making, 2015.

[C05] Fulga C., Preferences in Mean-Risk Portfolio Optimization, 13th EUROPT Workshop on Advances in Continuous Optimization, 2015.

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